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The Ergot Disease of Grains and Grasses

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Ergot in Grains and Grasses Its Importance in Feed and Seed

by F. J. GREANEY*

A serious outbreak of ergot, a disease which attacks rye, wheat, barley, sometimes oats, and many wild and cultivated grasses, occurred in the Prairie Provinces in 1962. The ergot disease was severe and general enough this year to cause substantial losses both in yield and grade, particularly in crops of rye and durum wheat. The significance of ergot however, extends beyond the actual losses in yield and grade, because the ergot bodies produced by this disease are poisonous to man and animals.

The purpose of this circular is to describe the ergot disease; to emphasize the dangers that are associated with the feeding of ergot-infested grains or roughages to farm animals; and to present the practical measures that can be taken for its control.

Figure 1

Heads of rye (left) and durum wheat (right) showing infection of ergot. Notice that the dark ergot bodies are produced where healthy kernels should be.

WHAT IS ERGOT?

Ergot is a plant disease. It is caused by a fungous. Ergot can be identified by the large, purplish-black, hard, horn-like fungous growths which take the place of the true kernels in the heads of diseased grains and grasses (Figure 1). The shape and size of the ergot bodies vary according to the kind of plant on which they develop. In rye they may be two or three times as big as normal kernels. The ergot bodies can be readily recognized in threshed grain by their colour, shape and size.

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concentration of ergot is by mixing grain contaminated with ergot with ergot-free grain or feed. If the percentage of ergot is reduced to a very low level such mixtures might be fed to fattening cattle. However, this should be done with caution, and with a clear understanding of the risks involved.

"ERGOTY" HAY AND STRAW

Most wild and cultivated grasses are affected by ergot. Owing to the fact that in some years a great deal of hay produced in the Prairie Provinces is likely to be heavily contaminated with ergot, farmers should be aware of the dangers associated with feeding ergot-infested hay to livestock.

In view of the widespread occurrence of ergot in rye, wheat and barley in certain years, farmers would be well advised to make sure that the straw and chaff of these crops they use for livestock feed is free, or relatively free, of ergot.

ERGOT CONTROL

There are four important practical measures that can be used to control ergot.

(1) The elimination of the ergot bodies from the seed.
(2) The destruction of the ergot bodies in the soil.
(3) Sanitary practices, particularly the early cutting of ergot-susceptible grasses along the borders of grain fields.
(4) Crop rotation. A succession of crops susceptible to ergot should be avoided.

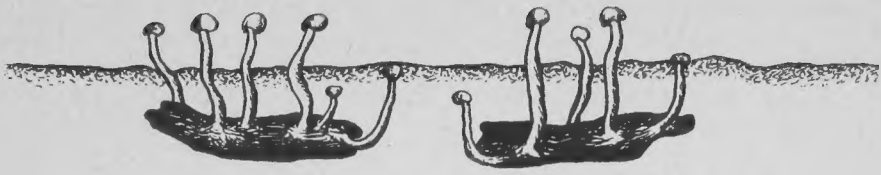
ELIMINATING ERGOT FROM SEED

A key practice for ergot control is the use of ergot-free seed. Most of the ergot bodies occurring in seed can be removed by means of modern grain-cleaning machinery, but it may be difficult to remove all the small and broken ones. The most effective way of eliminating them is to immerse the seed in a strong brine solution made by adding 40 pounds of common salt to 25 gallons of water. The seed is then stirred, and the ergot bodies float to the surface where they can be skimmed off. To prevent injury to germination, the seed must then be thoroughly washed to free it of salt, and dried immediately afterwards.

It should be mentioned here that ergot is not a "seed-borne" disease in the same way as the smut diseases of grain crops for the fungous which causes ergot is not carried on or in the seed, but with the seed, like weed impurities. So far, the treatment of ergot-infested seed with the modern cereal seed-treatment chemicals has shown little, if any, benefit. Seed treatment is therefore not recommended as a control measure for ergot.

DESTRUCTION OF ERGOT BODIES IN THE SOIL

In fields contaminated with ergot the soil should be worked so as to bury the ergot bodies which have fallen to the ground during harvest to a depth of at least two inches. Care should be taken that the cultivation is sufficiently deep to prevent the ergot bodies being brought to the surface by subsequent cultivations. Drill seeding of susceptible grain crops is recommended for in addition to burying deeply any ergot bodies that might be mixed with the seed, it helps to shorten the flowering period of the crop, thereby reducing the chances of infection.



Ergots Germinating in Soil

Figure 2

Ergot bodies germinating in the soil, showing typical fruiting structures.

DISEASE CYCLE

Many of the ergot bodies, when mature, fall from the ripened heads of grains and grasses to the ground, while others find their way into the threshed seed and are returned to the soil (Front Cover — Ergot in threshed sample of durum wheat). In the early summer, about the time grain and grass plants are in flower, the ergot bodies which are lying on, or near, the surface of the soil, germinate by sending out several stalks (Figure 2). In the heads of these stalks numerous spore-bearing pockets are formed. The spores are shot out of these pockets and carried upwards by air currents to the floral parts of susceptible grain and grass plants. Under favorable moist conditions the spores germinate and send out tiny threads which enter and infect the developing ovaries. In a few days a sweet, sticky honeydew, which contains thousands of spores, oozes out from the infected flowers. Insects, attracted by this honeydew, carry these new spores from one flower to another. Rain also helps to spread the spores. After some days the honeydew stage comes to an end, and the infected ovaries, instead of producing kernels of grain develop into the familiar hard, dark ergot bodies.

ERGOT IS POISONOUS

The ergot bodies or "ergots" produced in the heads of diseased grains and grasses contain poisonous substances which are known to affect the health of man and animals. When consumed by animals, ergot may cause abortion and the disease known as ergotism. In recent years the feeding or "ergoty" grain or hay to livestock has been responsible for the following conditions:

(1) Impairment of the general health of animals when ergot is consumed in quantities too small to give rise to pronounced symptoms of ergot poisoning.

(2) Abortion. The feeding of large amounts or continuous small amounts of ergot has caused abortion, particularly in cows and mares.

(3) When ergot was consumed in large amounts or in small amounts over a considerable period, losses from gangrenous ergotism have occurred.

(4) Cows and sows fed small amounts of ergot over an extended period failed to produce milk.

Even a small amount of ergot in the daily grain ration of farm animals may cause "Ergotism". In the early stages the disease is marked by irritation and pain in the extremities of the body. Later, a dry gangrene sets in, leading to the eventual loss of tail, ears, and perhaps hooves (Figure 3).

Figure 3

Diseased legs and tail from a cow showing advanced stages of ergot poisoning. (Courtesy of Dr. J. M. Bell, Department of Animal Science, University of Saskatchewan)

No class of livestock is considered immune to ergot poisoning. Cattle and horses are, however, more susceptible to the injurious effects of ergot than sheep and swine. It must also be pointed out that apart altogether from the danger of abortion and gangrenous ergotism, the feeding of ergot-infested grain, hay, or other feeds to farm animals is likely to result in slower gains and lower production.

For many years it has been known that ergot interferes with the blood circulation and produces digestive disturbances in poultry. On the basis of information presently available, farmers are strongly advised not to feed wheat or other grain screenings containing a high percentage of ergot to poultry.

Unfortunately, our knowledge of the poisonous effects of ergot to man and animals is limited. In fact, more basic and applied research on all aspects of the ergot disease of grains and grasses is urgently needed.

ERGOT IN FEED

Owing to the disastrous effects of ergot poisoning, feeders would be wise to exclude completely from their animal rations grain that is contaminated with ergot. This is particularly important with pregnant cows, sows, mares and ewes. On the basis of our present knowledge, any grain feed that contains one-tenth of one per cent (0.1%) or more of ergot material must be regarded as a definite source of danger. The tolerance of 0.1 per cent represents about 15 to 20 ergot bodies per pound of grain.

The concentration of ergot in any given lot of grain can, of course, be reduced through the efficient use of modern grain-cleaning equipment. Experience has shown, however, that even with the best of cleaning machinery it may be difficult to bring the percentage of ergot in heavily infested grain down to a safe level. Another way to reduce the

SANITARY PRACTICES

One of the chief sources of ergot infection in the Prairie Provinces appears to be infected grasses growing along fence lines, headlands or roadsides adjacent to grain fields. These should be cut soon after they come into head. The early cutting of susceptible grasses prevents the formation of the ergot bodies, and reduces the possible spread of the disease to nearby grain fields. For the same reason, grass meadows in the vicinity of grain fields should be mowed early, that is, while they are still in blossom.

It is generally agreed that the heaviest infestations of ergot in grain fields usually occur near the borders, particularly if the fields are surrounded by grassed fence lines, headlands or roadsides, or are adjacent to hay fields. Losses from ergot, particularly grain-grading losses, can be markedly reduced by harvesting and marketing separately grain from the borders of fields infected with ergot. Often two or three rounds with the combine will be sufficient to remove most of the grain that is heavily infected with ergot, thereby reducing the possibility of severe grade losses.

CROP ROTATION

A succession of crops susceptible to ergot should be avoided if at all possible. It is exceedingly important to avoid sowing either rye or durum wheat after ergot-infested crops of these grains. These are the two crops which suffer most severely from the ergot disease. In planning a rotation of crops it should be remembered that oats are seldom seriously affected by ergot, and that flax, rape, and other oilseed crops are not attacked by this disease.

No varieties of rye, wheat, or barley resistant to the ergot disease have been found. It should be emphasized, however, that the durum wheats are more susceptible to, and suffer more severely from, ergot than the common wheats. Sowing durum wheat after an ergot-infested crop of durum, or of rye, should be avoided.

No single farm practice can be specified which will effectively control the ergot disease of grains and grasses. Experience has shown, however, that, in the Prairie Provinces, losses from this disease can be largely prevented by the use of ergot-free seed; by deep plowing or cultivation to prevent germination of the ergot bodies which have fallen to the ground during harvest; by early mowing of susceptible grasses growing along the borders or in the vicinity of grain fields; and by avoiding the sowing of susceptible grain crops, particularly rye and durum wheat, after ergot-infested crops. In brief, the ergot disease can be kept under control by the use of ergot-free seed, crop sanitation and crop rotation.

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